

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strike through~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please CANCEL claims 5-8, 15, 16 and 25, and AMEND claims 2, 13, 22, 23 and 26 in accordance with the following:

1. (Cancelled)
2. (Currently Amended) A method of designing, constructing and operating a workshop facility design and operation support method using a computer having simulating means to formulate a virtual workshop data model, comprising:
 - ~~a virtual workshop verifying process of formulating a virtual workshop, that is a data model, by storing in a computer~~
 - storing information concerning structures of various rolling bearing production facilities and physical distribution facilities, which are to be newly established in a portion of newly established or existing workshops, information concerning structures of existing portions of those workshops, which are to be kept in existence, or information concerning structures of various rolling bearing production facilities and physical distribution facilities to be newly established in a newly established workshop designed newly in whole of an existing or newly established workshop having a portion or the whole that is newly designed;
 - storing information concerning functions of the various facilities;_i
 - storing information concerning control devices of the various facilities;_i
 - storing information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities;_i and
 - storing information concerning operating conditions and layouts of the various facilities of the workshop;_i

~~storing wherein a simulating means of the computer receives~~ settings of the adjustment conditions and ~~the~~ operating conditions;

~~simulating a virtual workshop and utilizing~~ the information and settings stored in the computer; ~~to~~

~~simulate~~ing productivity during operation of the virtual workshop, ~~during which, wherein~~ simulating productivity comprises:

simulating manufacturing virtual products ~~are manufactured~~ in the virtual workshop, and

simulating rolling bearing production state, including production of the virtual ~~products~~rolling bearings, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual ~~products~~rolling bearings on the layouts is monitored, ~~to thereby~~

verifying the virtual workshop by adjusting the information and settings stored in the computer so that the simulated productivity is optimized;

~~a workshop development process of constructing an actual~~ completed workshop including various facilities and layouts compatible with the verified virtual workshop; ~~and~~

~~a remote monitoring process of~~ remotely monitoring the rolling bearing production state and the physical distribution state of the facilities in the layout employed in the actual completed workshop so constructed; ~~and~~

comparing the rolling bearing production state and the physical distribution state on the layout in the actual completed workshop that have been monitored, with the rolling bearing production state and the physical distribution state on the layouts that have been simulated, to update the data model, and selectively re-perform the virtual workshop verifying process.

3-9. (Cancelled)

10. (Previously Presented) The method as claimed in claim 2, wherein during the workshop deployment process, information on operating conditions set during the virtual workshop verifying process are transmitted through a data communication means to the facilities of the actual workshop.

11. (Previously Presented) The method as claimed in claim 2, further comprising:
during the remote monitoring process, performing a remote maintenance of the facility
using information obtained during the remote monitoring.

12. (Cancelled)

13. (Currently Amended) A workshop facility design and work support system
including a computer, comprising:

a virtual workshop ~~system including, which is to be newly constructed, stored in the~~
~~computer, the virtual workshop being based on a computer, the system including a virtual~~
~~workshop authoring unit authoring a virtual workshop by storing in the computer~~ information
concerning structures of various rolling bearing production facilities and physical distribution
facilities which are to be newly established in a workshop, information concerning functions of
the various facilities, information concerning control devices of the various facilities, information
concerning configurations and information concerning adjustment conditions necessary to adjust
the rolling bearing production facilities and the physical distribution facilities, and information
concerning operating conditions of and layouts of the various facilities of the workshop, and

a simulating unit that receives settings of ~~the~~ adjustment conditions and ~~the~~ operating
conditions of the virtual workshop, and utilizes the information stored in the computer to
simulate productivity during operation of the virtual workshop, during which virtual rolling
bearings ~~products~~ are manufactured in the virtual workshop, production state, including
production of the virtual ~~products~~ rolling bearings, production of virtual work in process, and
distribution state, including flow of virtual work in process and flow of finished virtual
~~products~~ rolling bearings on the layouts is monitored, ~~to thereby verify wherein~~ the virtual
workshop is verified by adjusting the information and settings stored in the computer so that the
simulated productivity is optimized;

an actual completed workshop constructed according to the model of the virtual
workshop so verified; and

a remote monitoring unit that remotely monitors the production state and the physical
distribution state of the facilities in a layout employed in the actual completed workshop
constructed according to the model of the virtual workshop so verified, and compares the
rolling bearing production state and physical distribution state on the layout in the actual

completed workshop with the rolling bearing production state and distribution state on the layouts that have been simulated by the simulating unit.

14-21. (Cancelled)

22. (Currently Amended) A virtual workshop-remote monitoring link system, comprising:

a virtual workshop system to verify a workshop which is to be newly constructed, the virtual workshop system comprising:

a computer,

a plurality of rolling bearing production facilities, which are to be newly established and at least one dedicated equipment having modular units that can be interchangeably fitted one at a time to a process machine of a common specification, a rolling bearing production line being defined as at least one rolling bearing production facility,

a virtual workshop authoring ~~means authoring unit that authors~~ a virtual workshop by storing in the computer information concerning structures of various rolling bearing production facilities and physical distribution facilities of a workshop, information concerning functions of the various facilities, information concerning control devices of the facilities, information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities, and information concerning operating conditions and layouts of the various workshop facilities, and

a simulating means to receive settings of the adjustment conditions and the operating conditions, and utilize the information stored in the computer to simulate productivity during operation of the virtual workshop, during which virtual rolling bearings~~products~~ are manufactured in the virtual workshop, production state, including production of the virtual rolling bearings~~products~~, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual rolling bearings~~products~~ on the layouts is monitored, ~~to thereby verify the virtual workshop, wherein the simulating means verifies the virtual workshop by~~ altering the adjustment conditions and operating conditions so that the simulated ~~simulating the~~ production state and the physical distribution state on the layouts is optimized when a modular unit of the production facility is interchanged;

an actual completed workshop constructed to correspond to the verified virtual workshop;

and

a remote monitoring system remote monitoring the actual completed workshop corresponding to the verified virtual workshop; ~~and~~

~~a link means performing a linking process between the virtual workshop system and the remote monitoring system,~~

wherein the remote monitoring system performs a remote maintenance in the actual completed workshop using information obtained from the remote monitoring.

23. (Currently Amended) The virtual workshop-remote monitoring link system as claimed in claim 22, wherein the remote monitoring system displays an image of an operator at the actual completed workshop and alphanumeric information used for monitoring or remote maintenance in side-by-side fashion, and transmits voice messages.

24-25. (Cancelled)

26. (Currently Amended) A virtual workshop-verifying system ~~complex~~, comprising:
a virtual workshop system ~~a virtual workshop system~~ to verify a workshop which is to be newly constructed, the virtual workshop system comprising:

a computer,

a plurality of rolling bearing production facilities, which are to be newly constructed and at least one dedicated equipment having modular units that can be interchangeably fitted one at a time to a process machine of a common specification, a rolling bearing production line being defined as at least one rolling bearing production facility,

a virtual workshop authoring unit ~~means authoring that authors~~ a virtual workshop by storing in the computer information concerning structures of various rolling bearing production facilities and physical distribution facilities of a workshop, information concerning functions of the various facilities, information concerning control devices of the facilities, information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities, and information concerning operating conditions and layouts of the various workshop facilities, and

a simulating ~~means~~unit ~~to that~~ receives settings of the adjustment conditions and the operating conditions, and utilize the information stored in the computer to simulate productivity during operation of the virtual workshop, during which virtual rolling bearings~~products~~ are manufactured in the virtual workshop, production state, including production of the virtual rolling bearings~~products~~, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual rolling bearings~~products~~ on the layouts is monitored, to thereby verify the virtual workshop, wherein the simulating ~~means~~unit verifies the virtual workshop by altering the adjustment conditions and operating conditions so that the simulated rolling bearings~~simulating the~~ production state and the physical distribution state on the layouts is optimized when a modular unit of the production facility is interchanged; and

an actual completed workshop constructed to correspond to the verified virtual workshop, wherein the actual completed workshop includes a production line defined by production facilities and physical distribution facilities, and

a plurality of production facilities form respective production line constituent elements, each facility being at least one dedicated equipment in which modular units are interchangeably fitted one at a time to a common process machine.

27-51. (Cancelled)